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POI No. 02-06

STUDENT LESSON
AN/PSS-11 MINE DETECTOR

MOS 12B
COMBAT ENGINEER
SKILL LEVEL I

PREPARED BY
UNITED STATES ARMY ENGINEER SCHOOL
FORT BELVOIR, VIRGINIA 22060

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TASK #051-192-1023 Locate Metal Using the AN/PSS-11 Mine Detector Set

TRAINING OBJECTIVES

TASK: Locate metal, using an AN/PSS-11 mine detector.

CONDITIONS: Given: an AN/PSS-11 mine detector correctly packed in it's case, a straight tip screw driver, and a small piece of metal (10d nail), during daylight, in an outside area with recorded locations of buried metal.

STANDARDS: Unpack, inspect, assemble, tune, operate, disassemble, and repack an AN/PSS-11 mine detector without error. Locate all buried metal in a designated area during operation.

STUDY RESOURCES

These references were used to prepare this lesson and are available for your use anytime, except during testing. If you want to use a reference, ask the lesson manager.

FM 20-32 Mine/Countermine Operations at the Company Level
TM 5-6665-202-13 Land Mines
GTA 5-10-27 Mine Detector

STUDENT ADMINISTRATIVE INSTRUCTIONS

Pretest Option

You have a choice to either take a pretest or take the lesson. The pretest will test your knowledge and skills on the training objectives. The lesson will assist you in learning the training objective. DECIDE NOW.

If you have decided to take the pretest, notify the manager NOW. If you have decided to take the lesson, continue reading.

LESSON INTRODUCTION

Welcome to the lesson on the AN/PSS-11 mine detector set. This lesson explains the correct steps for operation of the AN/PSS-11 Mine Detector.

The mine detector is a portable device that is able to detect metallic objects. It is specifically intended for detecting metallic antitank or antipersonnel mines that are buried or hidden from sight. The presence of a metallic object is indicated by an audible tone in the headset.

The design of the mine detector is so compact that it is easily handled, operated, and transported. Figure 1 illustrates the unassembled mine detector with its carrying case.

Learning all of the procedures taught in the lesson will assist you in performing your MOS, give you more confidence in your ability to learn equipment that is new to you and will make you much more valuable to your unit.

Study Figure 1 and the demonstration mine detector for a few minutes to become familiar with the names of the parts of the AN/PSS-11 mine detector.

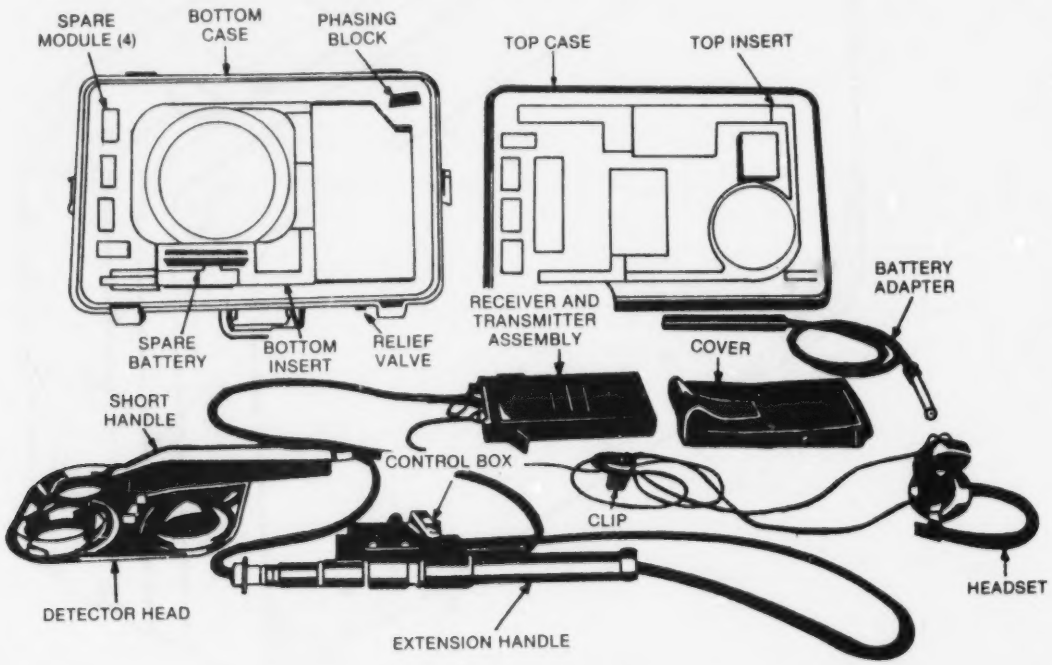

Figure 1 - Mine Detector Set

Learn as many of the names of the parts shown in Figure 1 as you can, then learn the procedures on this page. Learning the names of the parts will help you to perform the steps in the lesson.

The steps below are listed in the suggested sequence for complete and correct use of the AN/PSS-11 mine detector. These steps are fully explained in this lesson in the same sequence as listed.

PROCEDURE STEPS

STEP #1 - Remove the detector parts from the case.
STEP #2 - Assemble the detector.
STEP #3 - Adjust controls and tune the mine detector.
STEP #4 - Search for buried mines.
STEP #5 - Disassemble and repack the mine detector.

Learn the details of these five steps as you work through the lesson. As you study these five steps, you may use the demonstration mine detector.

STEP #1

REMOVE THE DETECTOR PARTS FROM THE CASE

1. Locate the relief valve on the outside of the case near the handle. Turn the relief valve (Figure 2) two turns counterclockwise to equalize interior and exterior air pressures.

2. Release the spring-type latches that secure the top case of the mine detector set to the bottom case. Open the case as in Figure 2.

WARNING

When releasing these six spring-loaded latches, place the thumb against the flat portion of the latch to prevent rebounding of the latch throw and injury to the fingers.

Figure 2 - Detector Set in Case

3. Remove the detector head, extension handle, receiver and transmitter assembly and headset from the case (see Figure 3).

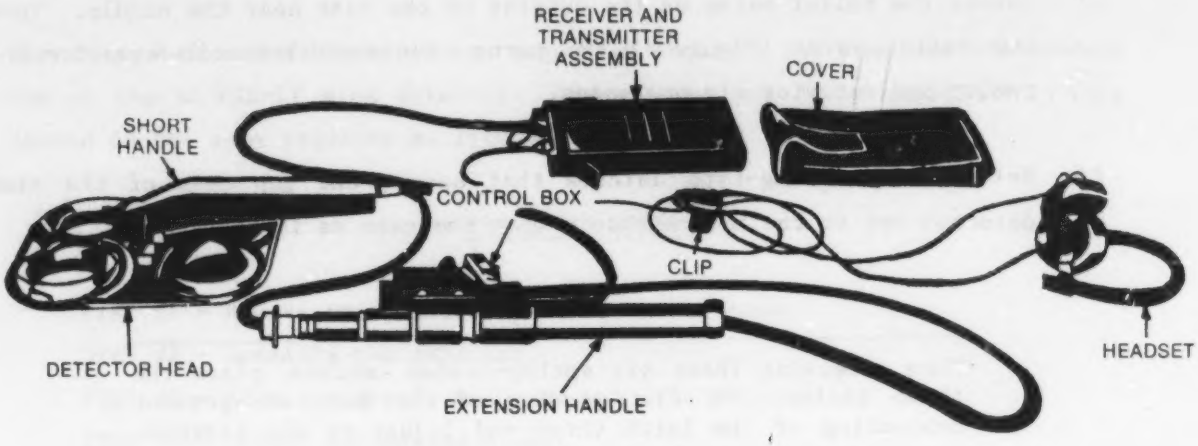

Figure 3 - Parts of an AN/PSS-11 Mine Detector

4. Perform the before operations maintenance checks listed below.

   a. Clean receiver and trasnmitter. Check for corrosion, missing hardware or other defects.

   b. Clean headset.

      1. Check for worn, cracked or frayed cables.
      2. Check for damaged or defective battery adapter.

   c. Clean and assemble the detector and check for damage and defects.

   d. Clean the case.

      1. Check for worn, damaged, or defective case.
      2. Check for torn lining, defective seals, defective latches, broken handles or plugged vents.

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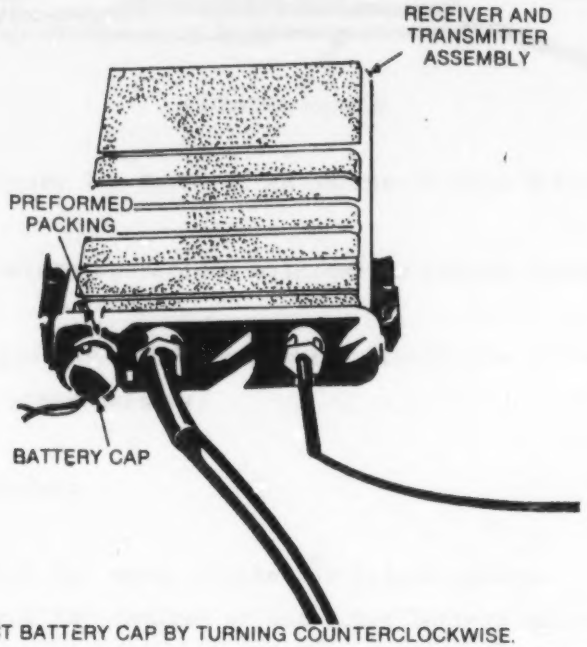
e. Check for worn, damaged or defective bag.

f. Inspect for damaged or loose mountings.

STEP #2

ASSEMBLE THE DETECTOR

1. Remove the battery from the case and install the battery in the receiver and transmitter assembly as explained in Figure 4.



STEP 1. DISCONNECT BATTERY CAP BY TURNING COUNTERCLOCKWISE.

STEP 2. INSTALL BATTERY, INSERTING NEGATIVE (MINUS) END FIRST. TO REMOVE BATTERY, HOLD RECEIVER AND TRANSMITTER ASSEMBLY UPSIDE DOWN AND BATTERY WILL SLIDE OUT.

STEP 3. CONNECT BATTERY CAP BY TURNING CLOCKWISE UNTIL SNUG.

NOTE: PREFORMED PACKING MUST BE SUFFICIENTLY COMPRESSED TO FORM WATERPROOF SEAL.

Figure 4 - Battery, Removal and Installation

Attach the Receiver Transmitter Assembly carrying case to your pistol belt by using the keeper and slide provided.

2. Connect the extension handle to the short handle (Figure 1). Adjust the extension handle, adjust the detector head and adjust the headset as explained in Figure 5.

Connecting and Adjusting Extension Handle.

STEP 1 - Pull coupling back and slide extension handle on short handle until coupling engages lock ring on end of short handle. Align keying pin so that extension handle fits flush against short handle.

STEP 2 - To extend handle, turn collet clockwise one-half turn and pull out on end section of extension handle. Secure section by turning collet counterclockwise until snug. Repeat this procedure on remaining sections until handle is fully extended or desired length is obtained.

Detector Head Adjustment.

STEP 1 - Loosen detector head friction nut by turning counterclockwise.

STEP 2 - Place detector head on terrain and shift extension handle to desired angle of operation.

STEP 3 - Tighten friction nut by turning clockwise until snug.

Headset Adjustment.

STEP 1 - Place headset on head.

STEP 2 - Slide adjusting band in or out of headband until headset fits head.

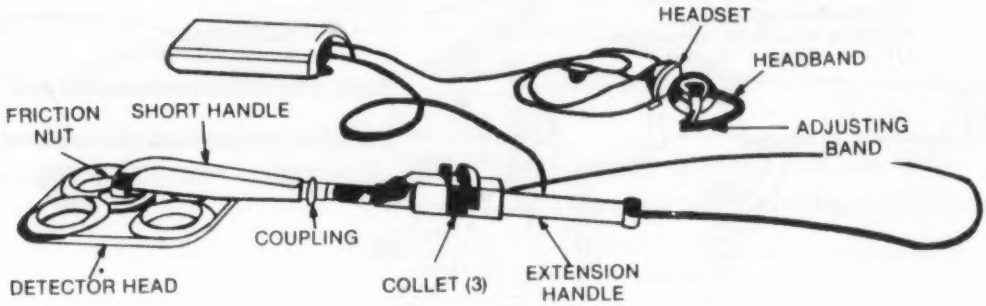


Figure 5 - Preparations for Search Operation

Now that you have properly assembled the mine detector, you are ready for Step 3.

STEP #3

ADJUST CONTROLS AND TUNE THE MINE DETECTOR

1. Refer to Figure 6 for a complete description of the controls. Normal positions of controls stated here assume temperature of 70° Fahrenheit. The normal positons may vary with higher or lower temperatures.

NOTE: Normal positions of the Fine "X" and the Fine "R", Control knobs are when the index mark on each Knob is aligned with the related index mark on the control box. (See Control Knobs and Index marks at Figure 6).

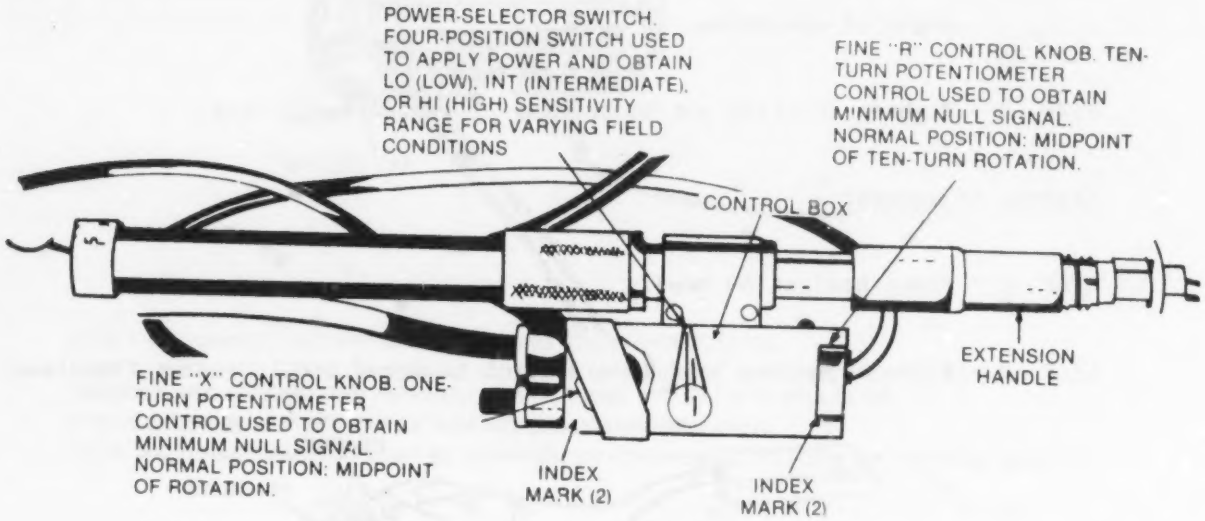

POWER-SELECTOR SWITCH. FOUR-POSITION SWITCH USED TO APPLY POWER AND OBTAIN LO (LOW), INT (INTERMEDIATE), OR HI (HIGH) SENSITIVITY RANGE FOR VARYING FIELD CONDITIONS
FINE "R" CONTROL KNOB. TEN-TURN POTENTIOMETER CONTROL USED TO OBTAIN MINIMUM NULL SIGNAL. NORMAL POSITION: MIDPOINT OF TEN-TURN ROTATION.
CONTROL BOX
EXTENSION HANDLE
FINE "X" CONTROL KNOB. ONE-TURN POTENTIOMETER CONTROL USED TO OBTAIN MINIMUM NULL SIGNAL. NORMAL POSITION: MIDPOINT OF ROTATION.
INDEX MARK (2)
INDEX MARK (2)

Figure 6 - Controls

Look at the Control Knobs again! Its important that you remember where these controls are, and what they do!!

2. Adjust controls for proper tuning as explained in Figure 7 below.

STARTING:

STEP 1 - Hold detector head five feet above the ground and at least five feet from metallic objects.

STEP 2 - Turn power selector switch to INT position.

STEP 3 - Align index mark on fine "X" control knob with related index mark on control box, align fine "R' control knob in like manner. (A 2,500 CPS ringing signal should be heard in headset.) Adjust control knobs until a minimum null (signal) is obtained.

STEP 4 - If null is not obtained, turn power selector switch to LO position and repeat Step 3.

CAUTION: Do not start unit unless detector head is at least five feet from metallic objects. Voltage induced by metallic objects can seriously damage untuned circuits.

NOTE: If minimum null cannot be obtained, report the condition to your lesson manager.

STOPPING:

Turn power selector switch to OFF position.

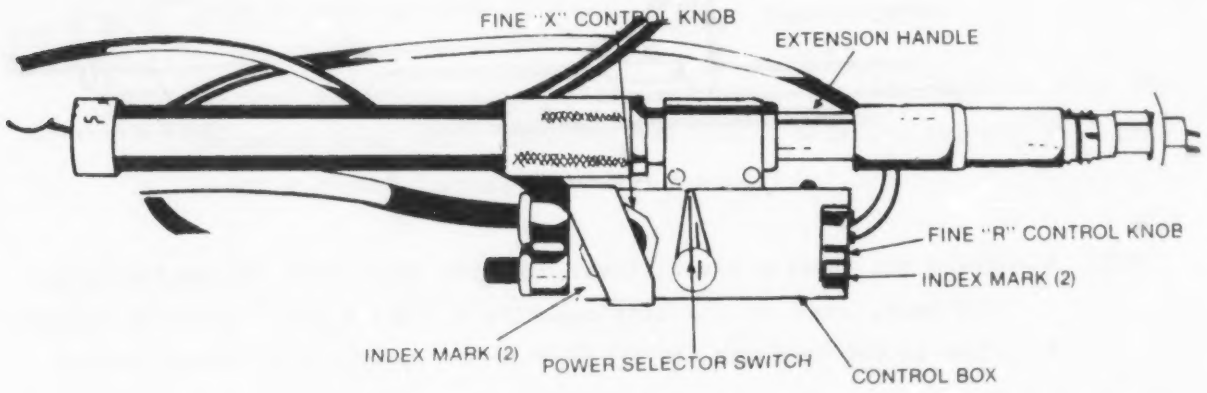


Figure 7 - Starting and Stopping the Mine Detector Set

Practice this procedure several times to be sure you know how to do it!

3. Variometer Phasing and Sensitivity Check: Refer to Figure 9 and check the mine detector set for variometer phasing and sensitivity. If variometer is not properly phased, report this condition to your manager.

Variometer Phasing Check.

STEP 1 - Depress the handle to the extreme end of it's travel so that the bottom of the short handle is approximately parallel with the top of the detector head.

STEP 2 - Start set and adjust for minimum null.

STEP 3 - Place a battery against the side of the short handle at the quick disconnect end so that it is perpendicular to the short handle with either end flush with the bottom of the short handle. Note the signal response in the headset. (Figure 8)

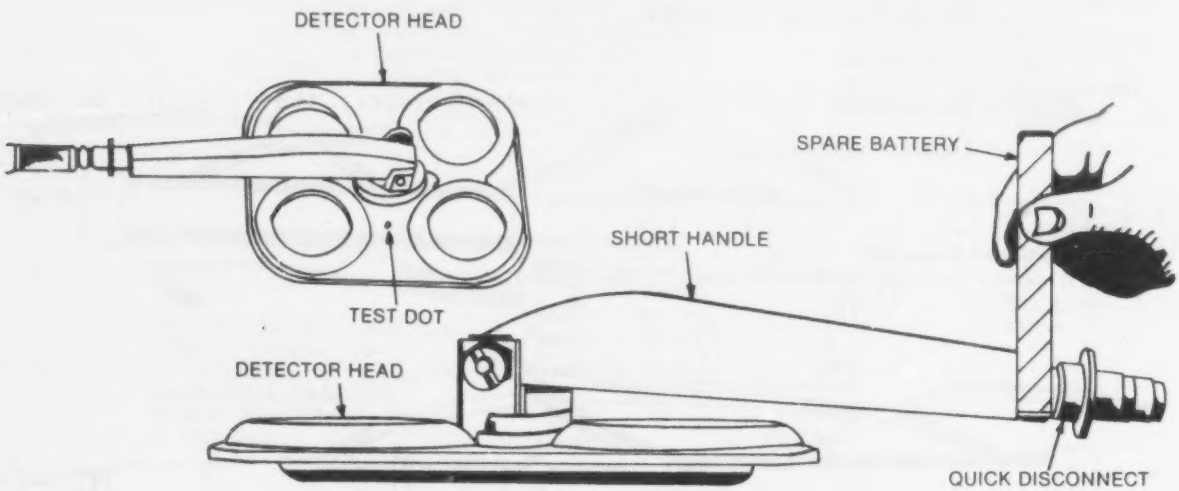


Figure 8 - Phasing Check

STEP 4 - Place the phasing block, first over the white test dot on the detector head, then on the side opposite the white dot. Note the signal rise in the headset.

STEP 5 - The signal response, when the phasing block is placed on either side of the detector head, should be less than the signal from the battery. A noticeably higher signal from the phasing block indicates incorrect variometer phasing in which case report the condition to your manager. Your manager will try and adjust the Variometer Visual Adjusting Screw to receive the correct signal (see Figure 9).

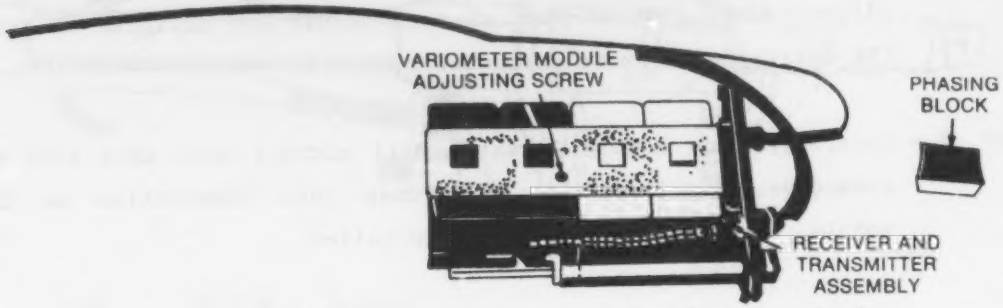


Figure 9 - Variometer Phasing and Sensitivity Checks

SENSITIVITY CHECK.

STEP 1 - Test the sensitivity of the set by switching the power selector switch to HI position and holding a coin (or other small metal object) about two inches above the white dot on the detector head. A definite increase in signal strength should be heard in the headset.

STEP 2 - If the signal response is weak, replace the battery in the set and repeat Step 1. If the signal response is still weak, replace the modules (Figure 10). If the signal remains low, report the condition to your manager.

NOTE: Do not allow rings, watches, or other metallic objects near the detector head while checking the set. Metallic objects will generate a signal in the headset.

Module Removal.

Remove module by grasping firmly with fingers and pulling.

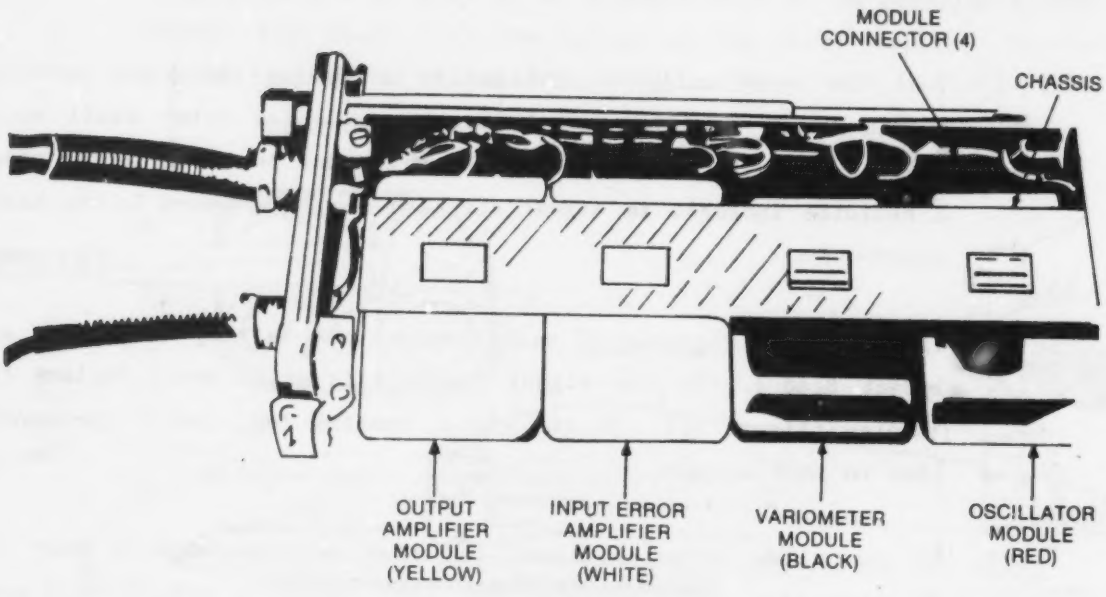
CAUTION: Avoid angular movement when removing or installing modules, bent or broken contact pins may result.

Module Installation

STEP 1 - Position module in chassis with indented side of module facing upward.

NOTE: Module locations are indicated by color coding of modules and spring clips. Also, contact pins of each module are designed to fit only the corresponding module connector.

STEP 2 - Carefully push module forward until contact pins mate with module connector, (spring) clip will snap into indentation on top of module, when module is properly installed.



Seems easy but it is very important to you for the equipment to work right.

Work the self-check practical exercise on the next page.

EXERCISE #1

Choose your answers from the list of words at Figure 11 below and write your answers on scratch paper. Identify the parts indicated by numbered arrows.

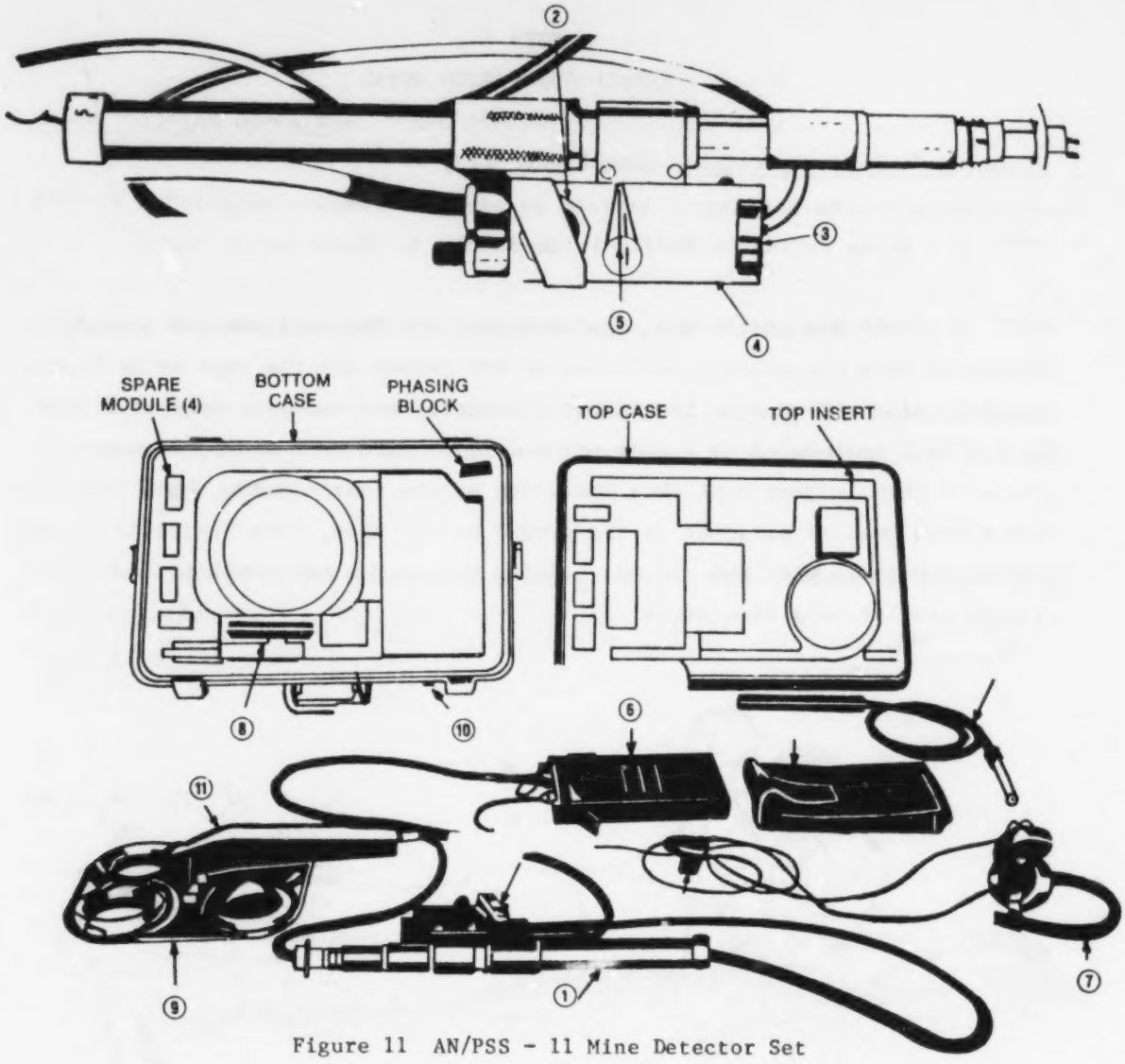


Figure 11 AN/PSS - 11 Mine Detector Set

A. Power Selection Switch
B. Extension Handle
C. Control Box
D. Fine "R" Control Knob
E. Fine "X" Control Knob
F. Headset
G. Detector Head
H. Short Handle
I. Receiver and Transmitter Assembly
J. Relief Valve
K. Spare Battery

Correct answers are located on Figures 1 and 7. If you missed more than 2 answers, restudy the lesson to this point. If you missed two or less than two continue the lesson with Step 4.

STEP #4

SEARCH FOR BURIED METAL

Standing Position Operation. (See Figure 12.)

STEP 1 - Grasp extension handle in hands.

STEP 2 - Hold the search head approximately 3-5 inches above the ground, depending upon the surface condition of the ground and the type of soil, and sweep it slowly from side to side at an approximate sweeping rate of 5 feet in 1 ½ to 3 seconds (2 to 3 feet per second). With each sweep, advance a distance that is just less than the width of the search head. Make sure that the search head is parallel to the ground at all time, (See Figure 12). Keep the search level with the ground, tilting the search head will produce a signal similar to a mine signal.

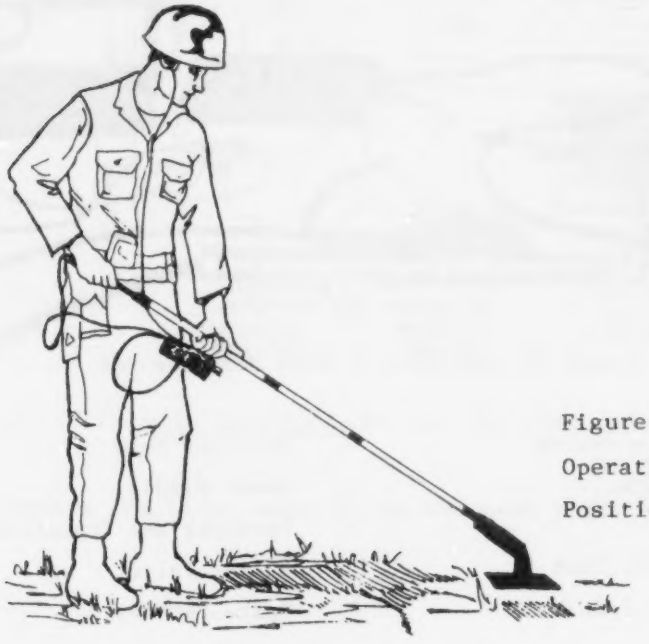


Figure 12 - Dector Set Operation in Standing Position.

STEP 3 - Make wide sweeping motions from side to side while walking forward slowly. Every inch of the area to be checked must be swept over to assure all metal is detected.

Prone Position Operation. (See Figure 13)

STEP 1 - Collapse extension handle to desired length and adjust detector head for proper angle of operation.

STEP 2 - Assume prone position, supporting weight on left forearm.

STEP 3 - Holding extension handle in right hand, use right forearm as leverage on rear of extension handle to keep detector head parallel with the ground.

STEP 4 - Make wide sweeping motions from side to side while crawling forward slowly.

Figure 13 - Dectector Set Operation in Prone Position

WARNING

If more than one mine detector set is being used in the area, keep the detector heads at least 20 feet apart, to avoid signal interference. A loud beat-type signal will be heard when units are operating too close to each other. Always keep the detector head parallel to the ground during a search operation.

2. Buried Metallic Object Encountered. A noted increase in the headset signal volume as the detector head is moved over the ground, is an indication that a metallic object is buried in this particular area. When a sharp change in signal volume is heard, move the detector head slowly from side to side. Increased signal will be noted as either side of the detector head is passed over the metallic object; a decrease will be noted as the center of the detector head moves over the buried object. If no decrease in signal volume is noted, as the center of the detector head moves over the buried object, the area has many small pieces of metal, causing a saturated condition to exist. If this occurs, raise the detector head one (1) or two (2) inches higher and repeat the sweeping motion. Repeat this process until a definite change in volume is evident when the detector head moves over the buried object. At this point the detector head is directly over the buried object.

WARNING

Be extremely careful when searching an area that is covered with metal fragments as there is danger of encountering metallic mines yielding signals that might be mistaken for those caused by the metal fragments.

CAUTION: When battery voltage drops below 7 volts the output amplifier module automatically induces a low raspy signal. Operation of equipment during this condition imperils life as voltage is below the required minimum level for detection of metallic objects. Mine detector operators should be relieved after short periods of time (approximately 20 minutes) to keep them from becoming tone deaf to the signals in the headset.

To accomplish Step 4 (Operating the detector in the standing and prone positions) are the only reasons for learning this lesson. Study Step 4 thoroughly.

STEP #5

DISASSEMBLY AND REPACK THE MINE DETECTOR

1. Remove the headset from your head.

2. Remove the receiver/transmitter assembly from your belt.

3. Collapse and disconnect the extension handle, see Figure 14.

Collapsing and Disconnecting Extension Handle.

STEP 1 - To collapse extension handle, loosen collets and slide sections forward, then tighten collets.

STEP 2 - Disconnect extension handle by pulling back on lock sleeve until lock ring short handle is released.

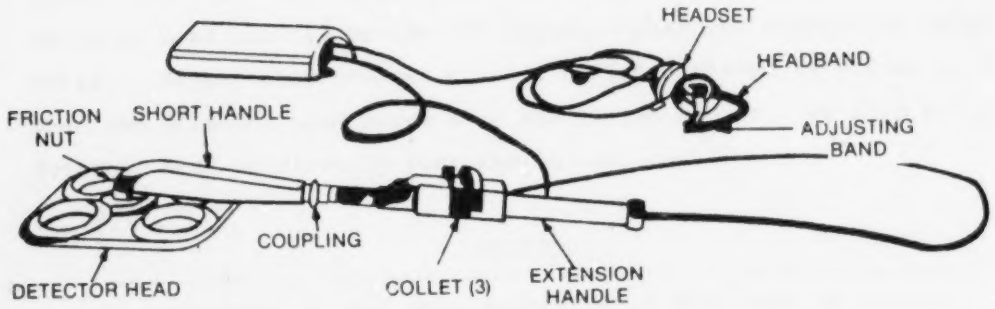


Figure 14 - Disassembly of AN/PSS-11 Mine Detector

4. Remove the battery from the receiver/transmitter assembly by following the directions in Figure 15.

STEP 1 - Disconnect battery cap by turning counterclockwise. To remove battery, hold receiver and transmitter assembly upside down and battery will slide out.

STEP 2 - Connect battery cap by turning clockwise until snug.

NOTE: Preformed packing must be sufficiently compressed to form water-proof seal.

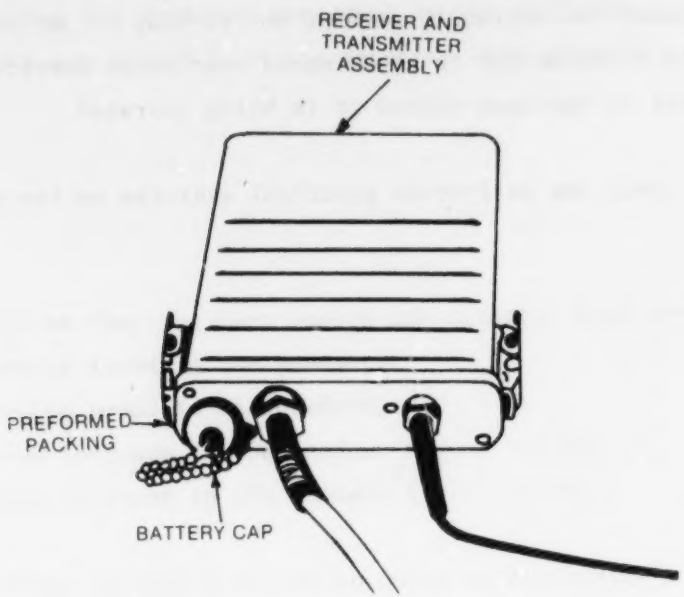


Figure 15 - Battery, Removal and Installation

5. Perform after operation maintenance listed below.

PART	JOB	TM 5-6665-202-13 Ref:
Headset.	Clean headset.	Paragraph 3-10
Detector Head and balance coil assembly.	Clean assembly and check for damage and defects.	Paragraph 3-11

6. Place the receiver and transmitter assembly, detector head and headset in their proper positions in the carrying case.

7. Place the top case on the bottom case and secure with the six latches provided on the bottom case.

CAUTION: After securing the case, close the relief valve by turning it clockwise until snug. This procedure pressurizes the interior of the detector case and protects the mine detector from moisture and dirt.

CAUTION: Exercise care when moving the mine detector set either in or out of the case. Be extremely careful not to bump or jar the equipment. If the detector set is to be moved over rough terrain, it must be secured in the case unless it is being operated.

End of lesson. Work the self-check practical exercise on the next page.

EXERCISE #2

Multiple choice. Choose one correct answer for each question. Write your answers on scratch paper.

1. When operating the detector set, what is the approximate height (in inches) that you should hold the detector head above the ground?
   a. 3-5.
   b. 3-7.
   c. 4-6.
   d. 5-8.

2. What indicates that you have passed the detector head over metal?
   a. A buzzing sound in the headset.
   b. A rasping sound in the headset.
   c. A noted increase in the headset signal volume.
   d. A noted decrease in the headset signal volume.

3. If no decrease in signal volume is noted as the center of the detector head moves over a metal object what is indicated?
   a. The battery is too weak.
   b. Area is saturated with metal.
   c. The modules need changing.
   d. You are tone-deaf.
   e. You have a loose connection.

4. After using the AN/PSS-11 mine detector the receiver/transmitter assembly is prepared for storage by:
   a. Oiling all metal parts.
   b. Disconnecting both cables.
   c. Turning the detector set off.
   d. Turn set off and remove the battery.

Correct answers are located on the next page.

EXERCISE #2 ANSWERS

1. a. 3-5.

2. c. A noted increase in the headset signal volume.

3. b. Area is saturated with metal.

4. d. Turn set off and remove the battery.

When you have completed studying this lesson, go the practice area and practice as much as you need.

When you have practiced enough to feel that you can accomplish the "Lesson Training Objective", go to the testing area and ask to be tested.

You may use this lesson during practice, but not during testing.

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